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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/767,668	01/29/2004	Julian S. Crawford	033583.00007	5426

7590

09/22/2006

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EXAMINER

GRAY, JILL M

ART UNIT	PAPER NUMBER
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1774

DATE MAILED: 09/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

8

Office Action Summary	Application No. 10/767,668	Applicant(s) CRAWFORD ET AL.	
	Examiner Jill M. Gray	Art Unit 1774	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 June 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2,10 and 24-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2,10 and 24-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>7/12/06</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Information Disclosure Statement

Prior art reference FR 2,466,517 submitted in the Information Disclosure Statement of July 12, 2006, has been considered by the examiner only to the extent that the examiner does not read, write or understand the French language.

Claim Rejections - 35 USC § 112

1. Claims 24 and 26 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. More specifically, the specification, as originally filed provides support for the range of 0.5% to 20%. There is no clear support in the specification supporting amount of 2% or 5% or the ranges of 0.5 to 5% and 2% to 5%.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 2, 10, and 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over DeAngelis et al, 6,855,421 B2 (DeAngelis) in view of Patel et al, 6,528,572 B1 and Shibuta 6,184,280 B1, for reasons of record.

DeAngelis teaches a yarn comprising a primary component and a secondary component, the primary component comprising a core yarn that can be monofilaments or multifilaments, i.e., at least one set elongated filaments, and said secondary component can be unset and is a blend of a single polymeric material and electrical conductors such as conductive fibers that can be formed from carbon, whereby said secondary component is bonded with said primary component along its length, per claims 24 and 26. See abstract, column 1, lines 49-59, column 2, lines 49-55, and Figure 1. The polymeric material is of the type contemplated by applicants in claim 2, such as polyethylene, and the secondary component can be a sheath bonded with and surrounding the primary component. See column 1, lines 60-65 and column 2, lines 24-26. DeAngelis does not specifically teach that the conductive fibers are carbon nanotubes in an amount of up to 05% of the multicomponent yarn.

Patel teaches conductive polymer compositions comprising polymeric resins and electrically conductive filler materials. These filler materials can be carbon fibers such as carbon nanotubes wherein the nanotubes can be used in amounts as low as 0.025 wt%. Shibuta teaches an electrically conductive polymer composition comprising carbon nanotubes, white pigment and polymer, wherein the carbon nanotubes are added in an amount of at least 0.01 wt% and less than 2 wt%. In addition, Shibuta teaches that his conductive polymer composition can be used to form moldings including electrically conductive filaments, and conjugate fibers (per claim 5). See column abstract, column 1, lines 7-9, column 2, lines 13-23, column 6, lines 9-14, column 8, lines 2-8 and lines 33-45. While Patel does not specifically teach the

Art Unit: 1774

formation of fibers from his composition, the teachings of Shibuta clearly demonstrate that it was known in the art at the time the invention was made that conductive polymer compositions are used in the formation of molded articles including electrically conductive filaments. In addition, the teachings of Patel and Shibuta clearly teach that the formation of conductive polymers using a blend of a polymer component and carbon nanotubes was known in the art at the time of the invention thereof, wherein lowered amounts of conductive filler was possible when using carbon nanotubes. Therefore, the teachings of Patel and Shibuta would have provided motivation to the skilled artisan at the time the invention was made, to modify the teachings of DeAngelis by using carbon nanotubes instead of carbon black as the conductive filler, with the reasonable expectation of obtaining a conductive polymeric composition and fiber with minimal filler loading without sacrificing the mechanical properties of the resultant fiber as well as minimizing the degree of blackening in the polymer composition. Moreover, there is no clear factual evidence on this record of superior or unexpected properties of the instant claimed yarn from that of the prior art.

Response to Arguments

3. Applicant's arguments filed June 29, 2006 have been fully considered but they are not persuasive.

Applicants argue that DeAngelis et al. is not concerned with nor discloses ratios of the conductive component relative to non-conductive sheath component nor the total non-conductive components of the multi-component yarn.

Art Unit: 1774

In this concern, it is the combined teachings of DeAngelis et al., Patel, and Shibuta that suggest modification of DeAngelis to result in the instant claimed ratios of conductive components.

Applicants argue that DeAngelis does not disclose the use of carbon nanotubes.

Agreeably DeAngelis does not disclose the use of carbon nanotubes. However, DeAngelis does teach that his conductive particles can be carbon fibers. At the time of the invention thereof, this teaching would have provided direction to one of ordinary skill in the art for the usage of carbon nanofibers, and more specifically, carbon nanotubes.

Applicants argue that DeAngelis does not disclose heat setting the core non-conductive component while not heat setting the cover or conductive component.

In this regard, the claims are not drawn to heat set or non heat set components. Agreeably DeAngelis does not specifically teach that his core as being set. Nonetheless, DeAngelis teaches that his core yarn can be comprised of polymeric, natural or inorganic fibers, further teaching high strength polymers and fibers such as "KEVLAR", "NOMEX", and glass. This teaching would have provided a suggestion to the skilled artisan for core yarns having increased mechanical and tensile properties, which is obtainable through polymers that are set. Moreover, the fact that DeAngelis uses preformed core yarns and specifies that the conductive polymer can be set, further providing different methods of setting, would have lead one of ordinary skill in the art at the time the invention was made to reasonably infer that the core yarn is set.

Applicants argue that DeAngelis is not concerned with providing a resilient conductive yarn but rather is directed to a yarn, which provides increasing or variable resistance electrical conductive features.

In this regard, the mere fact that the DeAngelis fails to evince an appreciation of the problem identified and solved by applicants is not, standing alone, conclusive evidence of the nonobviousness of the claimed subject matter. The reference may suggest doing, what an applicant has done even though workers in the art were ignorant of the existence of the problem. *In re Gershon*, 152 USPQ 602 (CCPA 1967).

Applicants argue that DeAngelis does not teach producing a multiple component yarn in which the non-conductive polymeric material is the same material in each component and that specific materials such as polyethylene, polyolefins, etc. are only disclosed as being possibly suitable for use with the matrix.

Agreeably DeAngelis does not specifically teach that the non-conductive polymeric material is the same material in each component. Nonetheless, DeAngelis teaches that the material can be thermoplastic or thermoset material. This teaching clearly embraces the polymers taught by DeAngelis for the core yarn.

Applicants argue that Patel does not disclose a multi-component yarn or structure, further arguing that Patel is limited to a resin composition which is conductive and does not disclose the use of this composition as one of two components forming a multi-component yarn and does not teach combining nano-carbon with only one component of a multi-component yarn in specific quantities with respect to the combination component and with both components.

Art Unit: 1774

In this concern, Patel is relied upon for all that he would have reasonably conveyed to one having ordinary skill in the art at the time the invention was made, namely, that the substitution of carbon nanotubes for other conductive carbon particles would have been obvious motivated by the ability to use smaller quantities while maintaining suitable conductivity levels. Said teachings would have provided motivation to modify the teachings of DeAngelis by using carbon nanotubes as his carbon fiber particles.

Applicants argue that Shibuta is similar to Patel in that it discloses only a single component or composition which may include carbon nanotubes in specific amounts relative to the composition, further arguing that Shibuta does not disclose a multi-component unit with one component comprising only polymeric material and the other component polymeric material in combination with carbon nanotubes and that specific volumes of the carbon nanotubes in combination with the combination component and the total structure to include both components are not made.

The examiner disagrees. In particular, applicants' attention is directed to column 9, lines 33-48 which teaches conjugate fibers with hollow carbon microfibers.

Applicants argue that no teaching exists to provide the percentage conductive material for the multi-component yarn and the percentage conductive material for the conductive component.

In this regard, it is the combined teachings of Patel and Shibuta that clearly put forth, at the time the invention was made, that the usage of carbon nanofibers results in

Art Unit: 1774

the ability to use lowered amounts of conductive filler. Clearly the skilled artisan would have been reasonably motivated to do so with the benefit of reduced costs.

Applicants argue that with respect to claim 24, DeAngelis does not teach setting the material forming one component and not setting the one material forming the second component of the multi-component yarn, thereby providing different elongation characteristics for the two components.

In this concern, the examiner is not persuaded for reasons stated previously in this response.

Applicants argue that the secondary references do not teach a multi-component yarn, merely a composition.

The examiner disagrees. Shibuta clearly teaches that conjugate fibers can be formed from his composition and thereby provides direction to the skilled artisan and a suggestion that conductive polymer compositions can be used in the formation of fibrous articles.

Applicants argue that to combine the disclosures of the secondary references or portions thereof with that of the primary reference is improper and that there is no motivation for such a combination, further arguing that there is no motivation to utilize carbon nanotubes disclosed in single composition as one of the compositions of a filament forming one component or a multi-component yarn.

The examiner disagrees. At the time of the invention thereof, the efficacious properties of carbon nanotubes were known in the art. It was equally known that carbon nanotubes could be substituted for other conductive carbon particles and thereby

Art Unit: 1774

drastically reduce the amounts needed with comparable conductive results. The fact that DeAngelis teaches particles that can be carbon fiber clearly provides direction to the skilled artisan for carbon nanofiber, and more specifically, carbon nanotubes.

Regarding claim 26, applicant argues that this claims is similar to claim 24 and that no reference teaches the instant structure.

In this regard, the examiner disagrees for reasons stated previously in this Office Action in reference to claim 24 and incorporated herein.

Applicants argue that the secondary references are directed to compositions and provide not additional teaching.

The examiner disagrees for reasons stated previously in this Office Action and incorporated herein.

Applicants argue that the claim further calls for the carbon nanotubes to comprise between .5% and 15% of the mass of the multi-component yarn and between 2% and 5% of the mass of the secondary component.

The examiner's position remains that the prior art teachings suggest the instant claimed amounts of carbon nanotubes, for reasons stated previously in this Office Action and incorporated herein.

Regarding claim 26 and original claim 5, the added teachings of Shibuta of conjugate fibers in the Office Action of April 5, 2006 obviate this claim, said claim 5 being included in the rejection set forth therein, note page 3 of said Office Action.

Accordingly, the examiner's position remains that the combined teaching of DeAngelis, Patel and Shibuta would have rendered obvious the invention of present claims 2, 10, and 24-26.

No claims are allowed.

Conclusion

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jill M. Gray whose telephone number is 571-272-1524. The examiner can normally be reached on M-Th and alternate Fridays 10:30-7:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rena Dye can be reached on 571-272-3186. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1774

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Jill M. Gray
Primary Examiner
Art Unit 1774

jmg